HP 86120B
Multi-Wavelength Meter

Technical Specifications

The HP 86120B Multi-Wavelength Meter is a Michelson interferometer-based instrument that measures wavelength and optical power of laser light in the 700 to 1650 nm wavelength range. Simultaneous measurements of multiple laser lines are performed allowing measurements of WDM (wavelength division multiplexed) signals and multiple lines of Fabry-Perot lasers. Each laser line is assumed to have a linewidth of less than 10 GHz.

This technical specifications sheet describes the measurement accuracy and operating condition of the HP 86120B Multi-Wavelength Meter. The **specifications** apply to all functions over the temperature range 0 to 55° C and relative humidity <95% (unless otherwise noted). All specifications apply after the instrument's temperature has been stabilized after 15 minutes continuous operation, and when the instrument is in NORMAL UPDATE mode unless noted.

Wavelength

Range
700 to 1650 nm (182 to 428 THz)
Absolute accuracy, laser lines separated by ≥30 GHz
±3 ppm (±0.005 nm at 1550 nm, ±0.004 nm at 1310 nm)
Differential accuracy[1]
±2 ppm
Minimum resolvable separation[1,2]
(equal power lines input)
20 GHz (0.16 nm at 1550 nm, 0.11 nm at 1300 nm)
Display resolution
0.001 nm, normal update mode
0.01 nm, fast update mode

Power

Calibration accuracy
±0.5 dB (at ±30 nm from 780,1310, and 1550 nm)
Flatness, 30 nm from any wavelength

1200 to 1600 nm[1]	±0.2 dB
700 to 1650 nm[1]	±0.5 dB
Linearity[3]	±0.3 dB
Polarization dependence,	
1200 to 1600 nm	±0.5 dB
700 to 1650 nm[1]	±1.0 dB
Display resolution	0.01 dB

[1] Characteristic
[2] For lines separated by less than 30 GHz, wavelength accuracy is reduced.
[3] 1200 to 1600 nm, lines above –30 dBm

Definition of Terms

Characteristics and Specifications

The distinction between specifications and characteristics is described as follows:
- *Specifications* describe warranted performance.
- *Characteristics* provide useful, but nonwarranted information about the functions and performance of the instrument.

Wavelength

- *Range* refers to the allowable wavelength range of the optical input signal.
- *Absolute accuracy* indicates the maximum wavelength error over the allowed environmental conditions.
- *Differential accuracy* indicates the maximum wavelength error in measuring the wavelength difference between two signals that are simultaneously present.
- *Minimum resolvable separation* indicates the minimum wavelength separation of two laser lines input required to measure each wavelength simultaneously. Two laser lines closer in wavelength than the minimum resolvable separation are not resolved and one average wavelength is displayed.
- *Display resolution* indicates the minimum incremental change in displayed wavelength.

Power

- *Calibration accuracy* indicates the maximum power calibration error at the specified wavelengths over the allowed environmental conditions.
- *Flatness* refers to the maximum amplitude error in a measurement between two lines that are separated in wavelength by no more than the specified amount.
- *Linearity* indicates the maximum power error in measuring the change in power of one laser line.
- *Polarization dependence* indicates the maximum displayed power variation as the polarization of the input signal is varied.
- *Display resolution* indicates the minimum incremental change in displayed power.

Sensitivity

- *Sensitivity* is defined as the minimum power level of a single laser line input to measure wavelength and power accurately. A laser line with less than the minimum power may be measured but with reduced wavelength and power accuracy. For multiple laser lines input, sensitivity may be limited by total input power.

Selectivity

- *Selectivity* indicates the ability to measure the wavelength and power of a weak laser line in the proximity of a specified stronger laser line and separated by the specified amount.

Input Power

- *Maximum displayed level* indicates the maximum total input power (total of all laser lines present) to accurately measure wavelength and power.
- *Maximum safe input power* indicates the maximum total input power (total of all laser lines present) to avoid permanent optical damage to the instrument.

Maximum Number of Lines Input

- *Maximum number of lines input* is the maximum number of displayed lines. If more than 100 lines are input, only the 100 longest wavelength lines are displayed.

Input Return Loss

- *Input return loss* indicates the optical power reflected back to the user's fiber cable relative to the input power. It is limited by the return loss of the front panel connector, and assumes the user's connector is good.

Measurement Cycle Time

- *Measurement cycle time* refers to the cycle time when measuring wavelength and power of laser lines. Specific advanced applications may require longer cycle times.

Sensitivity[4]

700 to 800 nm, single line input –20 dBm
800 to 1200 nm, single line input –25 dBm
1200 to 1600 nm, single line input[5] –40 dBm
1600 to 1650 nm, single line input[5] –30 dBm
700 to 1650 nm, multiple lines input[1]
30 dB below total input power, but not less than single line input sensitivity

Selectivity

2 lines input separated by ≥100 GHz[1] 25 dB
2 lines input separated by ≥30 GHz[1] 10 dB

Input Power

Maximum displayed level (sum of all lines input)
+10 dBm
Maximum safe input level (sum of all lines input)
+18 dBm

Maximum Number of Laser Lines Input

100

Input Return Loss

With flat contacting connectors 35 dB
With angled contacting connectors (option 022) 50 dB

Measurement Cycle Time

Normal update mode[1]
1.0 sec (1 measurement/sec)
Fast update mode[1]
0.33 sec (3 measurements/sec)

Wavelength Units

nm (vacuum or standard air), cm^{-1}, THz

Power Units

dBm, mW, µW

Measurement Modes

List by Wavelength Table, List by Power Table, Single Wavelength and Power, Average Wavelength and Total Power

Delta Modes

Delta Wavelength, Delta Power, Delta Wavelength and Power

Built in Automatic Measurement Applications

Signal-to-Noise Ratio[1]
>35 dB (0.1 nm noise bandwidth), lines above –25 dBm
Signal-to-Noise Ratio[1] **of Modulated Lasers (with Averaging)**
>35 dB (0.1 nm noise bandwidth), lines above –25 dBm, with 100 averages
Drift
Maximum, minimum, total drift (max-min) of wavelengths and powers over time

Coherence length[1]
Fabry-Perot lasers, 1 to 200 mm coherence length, accuracy to within ±5%, 0.75 sec cycle time

Additional Features

Power Offset, Power Bars (On or Off), user adjustable Peak Excursion and Peak Threshold, user adjustable Start and Stop wavelength limits, Graphical display, Save and Recall instrument states.

Inputs/Outputs

Optical input 9/125 µm fiber

Rear panel connectors
HPIB, parallel printer port, AC Line

Dimensions and Weight

Dimensions
140 mm high x 340 mm wide x 465 mm deep
(5.5 in x 13.4 in x 18.3 in)
Weight
9 kg (19 lb)

Environmental

	Operational	Storage
Temperature (warranted)	0° C to +55° C	–40° C to +70° C
Humidity (type tested)	<95% R.H. at +40° C, 5 day soak	Noncondensing 90% R.H. at +65° C for 24 hrs.
Shock (type tested)	300 g, half sine, 2 msec pulse	
Vibration (type tested)	Random, 5 g rms 5 to 500 Hz, 10 min./axis Sine, 0.75 g (0 to peak) 5 to 500 Hz, 1 octave/min.	
EMC	Conducted and radiated interference is in compliance with CISPR Pub 11, IEC 801-2, IEC 801-3, IEC 801-4 and IEC 555-2	

Note: "type tested" means tested, but not warranted, for continuous operation.

Power Requirements

Voltage and frequency
88 to 269 VAC, 45 Hz to 440 Hz
Maximum power
70 watts max (125 VA max)

1 Characteristic
2 For lines separated by less than 30 GHz, wavelength accuracy is reduced.
3 1200 to 1600 nm, lines above –30 dBm
4 Contact HP for availability of special instruments with higher sensitivity.
5 Spurious free under Preset conditions

Ordering Information

HP 86120B Multi-Wavelength Meter
Standard instrument includes a front-panel FC/PC optical fiber connector interface and a User's Manual.

Connector options replacing the standard FC/PC connector interface:

Option 011	HMS-10/HP
Option 013	DIN
Option 014	ST
Option 017	SC
Option 022	Replace flat physical contact interface with angled physical contact interface

Additional connector interfaces can be ordered separately:

HP 81000AI	Diamond HMS-10/HP connector interface
HP 81000FI	FC/PC/SPC/APC connector interface
HP 81000GI	D4 connector interface
HP 81000KI	SC connector interface
HP 81000SI	DIN 47256/4108.6 connector interface
HP 81000VI	ST connector interface
HP 81000WI	Biconic connector interface

Fixed external 10 dB attenuators:

Option 412	FC/PC
Option 417	FC/APC (requires option 022)

Other options:

Option 512	Upgrade of existing HP 86120A to HP 86120B specifications
Option UK5	Nylon carrying case with shoulder strap
Option UK6	Commercial calibration certificate with test data

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